

**Curing.** Cure the rhizomes first under 90% relative humidity and 25<sup>o</sup>–30<sup>o</sup>C for 9 days. If available, spray or dip the rhizomes in fruit wax to prevent shriveling.

**Grading.** Classify rhizomes according to size, weight, and appearance. Select healthy rhizomes and discard those that are infected with diseases. The size classification for ginger is as follows:

Classification	Size	Weight (g)
Class I	Large	> 300
Class II	Medium	150–300
Class III	Small	< 150

**Storage after curing.** Store only clean and healthy rhizomes. Keep the 10-month old rhizomes under 7.2°C and the younger rhizomes at 13°C. Maintain relative humidity at 75% to minimize weight loss, sprouting, and rotting.

In areas where cold storage is not available, farmers keep their harvest in 2-m deep pits of up to 2 t capacity. These pits, covered with banana or coconut leaves, are located under the shade in backyards. Through this practice, ginger rhizomes can be kept for a year.

Marketing

Ginger is generally sold in the local market by the “kaing”, can, sack, kilo, pile or “tumpok”, or by piece. In the export market, ginger is sold in fresh, preserved, or dried forms. Dried ginger comprises more than 50% of the ginger sold in the foreign market. It is classified as peeled, unpeeled, whole, or split.

Cost and Return Analysis per Hectare	
Items	Amount (P)
<b>VARIABLE COSTS</b>	
<b>Labor (P220/man-day [MD])</b>	
Clearing (5 MD)	1,100
Plowing (P800/tractor hr x 4 hrs)	3,200
Harrowing (P800/tractor hr X 2 hrs)	1,600
Furrowing (P350/man-animal-day [MAD] x 1 day)	350
Manure application (5 MD)	1,100
Seed preparation (3 MD)	660
Planting (5 MD)	1,100
Sidedressing (2x) (4 MD)	880
Weeding (4x) (72 MD)	15,840
Irrigation (10 MD)	2,200
Harvesting/hauling (60 MD)	13,200

Cleaning/sorting (60 MD)	13,200
Miscellaneous (e.g., hauling, repairs, etc.) (10 MD)	2,200
Subtotal	56,630
<b>Materials</b>	
Seeds (800 kg)	17,500
Manure (40 sacks)	3,200
Fertilizer	
- 14-14-14 (11.5 bags)	9,465
- 0-0-60 (4 bags)	3,412
Fuel and oil	4,000
Packaging materials	3,000
Miscellaneous (e.g., pail, gloves, etc.)	2,000
Subtotal	42,577
<b>Interest on Production Loans at 21% p.a.</b>	
Total (Variable Costs)	120,207
<b>FIXED COSTS</b>	
Land rental	20,000
Depreciation	
Scythe (5 pcs)	83
Spading fork or hoe (5 pcs)	417
Shovel (3 pcs)	250
Plastic basin (2 pcs)	533
Total (Fixed Costs)	21,283
<b>Total Costs</b>	141,490
<b>Gross Income</b>	
Regular season (at P10/kg with 30 t/ha yield)	300,000
Offseason (at P20/kg with 20t/ha yield)	400,000
<b>Net Income</b>	
Regular season	158,510
Offseason	258,510

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Prepared by:

Dr. Rodel G. Maghirang, University Researcher  
Ms. Ma. Luisa D. Guevarra, University Research Associate I  
Ms. Gloria S. Rodulfo, Agricultural Technician II  
Crop Genetics and Plant Breeding Division  
Crop Science Cluster – Institute of Plant Breeding (IPB)  
College of Agriculture (CA)  
University of the Philippines Los Baños (UPLB)  
College 4031, Laguna

Editorial/Production Staff:

Dr. Jocelyn E. Eusebio, Director, Crops Research Division (CRD)-PCARRD  
Dr. Ester L. Lopez, Assistant Director, CRD-PCARRD  
Mr. Elmer E. Enicola, Cluster Chair for Vegetables, Legumes and Rootcrops, PCARRD and University Researcher, IPB, CA-UPLB  
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Mr. Paul Jersey G. Leron, Editor, Applied Communication Division (ACD)-PCARRD  
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**DEPARTMENT OF TRADE & INDUSTRY**  
**BUREAU OF MICRO, SMALL AND MEDIUM ENTERPRISE DEVELOPMENT (BMSMED)**  
5/F, Trade and Industry Building  
361 Sen. Gil J. Puyat Ave. Makati City  
Trunkline No.: 751.0384  
Tel. Nos.: (02) 897.1693 / 897.7596 / 890.4968  
Fax No.: (02) 896.7916 ♦ Email: [bmsmed@dti.gov.ph](mailto:bmsmed@dti.gov.ph)  
[www.dti.gov.ph](http://www.dti.gov.ph)



**PHILIPPINE COUNCIL FOR AGRICULTURE, FORESTRY AND NATURAL RESOURCES RESEARCH AND DEVELOPMENT (PCARRD)**  
Department of Science and Technology (DOST)



**DEPARTMENT OF SCIENCE AND TECHNOLOGY**  
Small Enterprise Technology Upgrading Program (SET-UP)



# Ginger Production Guide



## Introduction

Ginger (*Zingiber officinale* Roscoe) is popular for its distinct sharp and hot flavor due to an oily substance called gingerol. It is known as ‘luya’ in Tagalog, ‘shoga’ (Japanese), ‘chiang’ (Chinese), ‘jingibre’ (Spanish), ‘gingembre’ (French), and ‘zanjabil’ (Arabic). It has an aerial part of about 0.8 m high, which could grow up to 1.5 m tall (in Costa Rica, Hawaii, and Honduras) and a finger-like perennial underground part or rhizomes called hands.

The top producing countries are India, China, Indonesia, Nigeria, and Thailand. In 2006, the area planted to ginger in the Philippines was 3,916 hectares (ha) with a total production of 27,261 tons (t). Cagayan Valley was the largest producer (5,566 t), followed by Calabarzon (4,969 t), and Northern Mindanao (4,029 t). Ginger is exported to Japan, Germany, Hong Kong, Britain, and Northern Ireland (Bureau of Agricultural Statistics [BAS], 2006).

## Uses and Nutritional Value

Ginger can be consumed fresh, dehydrated, powdered, or pickled. ‘Salabat,’ or ginger tea, a popular hot drink, is made from boiled fresh ginger or powdered ginger. Ginger adds flavor to some common Filipino dishes like tinola, goto, arroz caldo, paksiw, batchoy, and pinakbet. It is also used as an ingredient in the manufacture of perfumes and softdrinks and in the preparation of preserves, candies, and pickles. The Chinese consider ginger as the yang of hot/spicy food, which balances cold meals. It is also considered as ying for creating harmony.

Ginger stimulates gastric juice secretion and relieves cough and flu. It is also used to treat migraine, travel sickness, and rheumatoid arthritis. It is known to improve blood circulation and reduce fat deposits in the arteries. In India, ginger is used in the preparation of many ayurvedic formulations, ‘ayurveda’ being the traditional Indian medical discipline. The curative properties of ginger come from the volatile oil that contains cingibereno, cingiberol, borneol, felandreno, citral, cineol, starch, mucilage, and resin, among other substances.

Per 100 grams (g) edible portion, ginger contains:

Properties	Amount
Energy (kcal)	46.0
Protein (g)	1.1
Fiber (g)	2.4
Ash (g)	0.8
Calcium (mg)	32.0
Phosphorus (mg)	30.0
Iron (mg)	3.0
Thiamine (mg)	0.04

Riboflavin (mg)	0.04
Niacin (mg)	0.6
Ascorbic acid (mg)	4.0

Source: The Philippine Food Composition Tables, 1997. Food and Nutrition Research Institute-Department of Science and Technology (FNRI-DOST).

# Production Management

## Varieties

Ginger varieties differ in size and shape of rhizomes, yield, moisture content, quality, and flavor. The following are the more common varieties in the Philippines with their corresponding rhizome characteristics:

Variety	Rhizome Characteristics
Native	Small, fibrous, very pungent, best for making salabat
Red Native	Small, red, fibrous, very pungent
Imugan	Medium-sized, slightly fibrous, pungent
Hawaiian	Large, plump, yellowish brown, less pungent
Jamaica “Oya”	Medium-sized, pale-colored, gives off pleasant, agreeable aroma in dehydrated form
Canton or Chinese	Large, yellowish, succulent, less fibrous, less pungent

### Soil and Climate Requirements

Ginger can be grown in flat to slightly rolling areas with well-drained, light to medium textured soil high in organic matter and pH of 6.8–7.0. It can grow in elevations of up to 1,500 meters (m) above sea level with about 200–300 cm annual rainfall evenly distributed throughout the year and a temperature range of 25<sup>o</sup>–35<sup>o</sup>C. It grows well even with 25–40% shading.

### Planting Materials

About 800 to 1,500 kg seedpieces are required per hectare. Store ginger roots under shade and cover with banana or coconut leaves. Select healthy rhizomes with sprouts or eyes just before planting. Cut into pieces with 3–4 sprouts each.

The seedpieces may also be pre-germinated for uniform growth. Prepare raised beds of any desired length measuring 1 m wide and 20 cm high. Line sow the seedpieces 2 cm apart and cover with a mixture of compost and coir dust. Water as needed. Transplant when the sprouts are about 1–2 cm long. New varieties can also be propagated by micropropagation or tissue culture to increase the rate of multiplication.

### Clearing

Clear the area of bushes or stubbles of previous crop to facilitate land preparation. These can be used in compost piles and should not be burned.

### Land Preparation

Plow the field twice then harrow to pulverize the soil. Make furrows 1 m apart. Incorporate fully decomposed chicken manure at 3–5 t/ha.

### Planting

Planting is done at the start of the rainy season, usually April to May. In areas with abundant supply of water throughout the year, planting can be done anytime. Distribute pre-germinated seed pieces in furrows 30 cm apart and cover lightly with soil. In small-scale plantings, mulch with rice straw or coconut leaves. Ginger is usually intercropped with perennial crops such as coconut and coffee. Multiple cropping of ginger (0.3 m x 3 m), papaya (3 m x 3 m), pineapple (0.3 m x 0.75 m), and tomato (1.0 m x 3.0 m) is a common practice in Cavite.

### Fertilization

Ginger takes up large amounts of nutrients. The general fertilizer requirement is 180 kg/ha N, 180 kg/ha P<sub>2</sub>O<sub>5</sub>, and 255 kg/ha K<sub>2</sub>O. The considerably high K requirement makes ginger sensitive to low K supply. A hectare of ginger requires 11.5 bags 14-14-14 and 4 bags 0-0-60 in addition to 5 t/ha chicken or animal manure. Incorporate manure during furrow preparation and apply inorganic fertilizers as sidedress at 30 and 60 days after planting.

### Irrigation

Ginger requires light but frequent irrigation during the vegetative stage, if rainfall is not evenly distributed. Depending on soil type and seasonal rainfall, irrigation varies from 4 to 7 days.

### Weeding

Ginger generally requires regular hand weeding during its growth period. Hand weed 1 month after planting. The frequency of subsequent weeding depends on weed density. Mulch with coconut leaves or rice straw to suppress weed growth.

### Pest and Disease Management

Cutworms, scale insects, and aphids are common ginger pests, but they do not cause significant yield losses. Leaf spot, rhizome rot, and bacterial wilt are some of the major diseases. Ginger is tolerant to leafspot. Rhizome rot can be prevented by strict sanitation and use of *Trichoderma* as part of organic fertilization. During storage, separate healthy rhizomes from shriveled and discolored ones. Bacterial wilt infection can be avoided by planting in bacterial wilt-free areas. Pull out infected plants and burn.

### Harvesting

Harvest ginger when the leaves turn yellow and wither. This is about 8–10 months after planting, depending on the variety used. To harvest, dig each hill with a spading fork or a hoe, pull the entire plant, shake off the soil, lay on top of the bed, and cut off the stem without breaking the rhizomes. Care should be practiced during harvesting to minimize injury that results to faster weight loss and susceptibility to decay. Harvest according to the following market requirements:

Market/Product Forms	Harvesting Period (months after planting)
domestic market	8–11
salted and pickled	5–7
pickled (for export)	3
dehydrated	6–8
fresh ginger (for export)	7–10

### Postharvest Handling

**Cleaning/Washing.** Trim off the shoots and roots and clean the rhizomes immediately after harvest. Wash the rhizomes first to remove soil particles then wash again in water with sodium hypochlorite prepared at 1 drop of 30% sodium hypochlorite per 3.8 L water to disinfect the rhizome and heal the wound faster. Air-dry the rhizomes after washing.